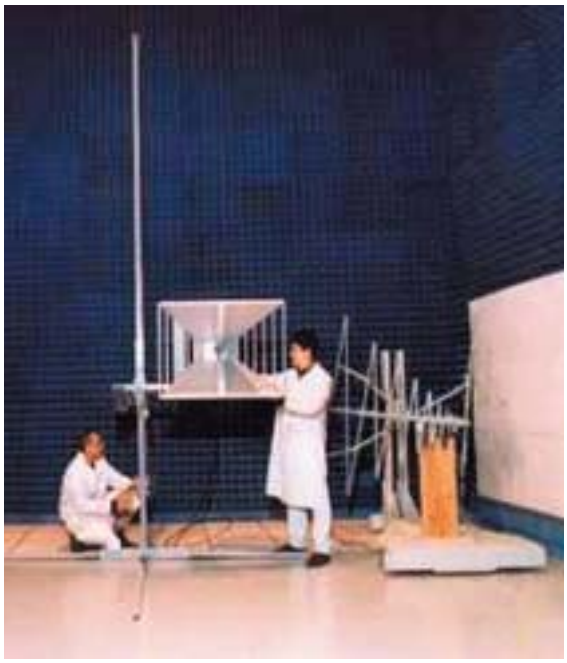
National Aeronautics and
Space Administration

Marshall Space Flight Center
Huntsville, AL 35812

Space Systems Department
Electrical Integration & Fabrication

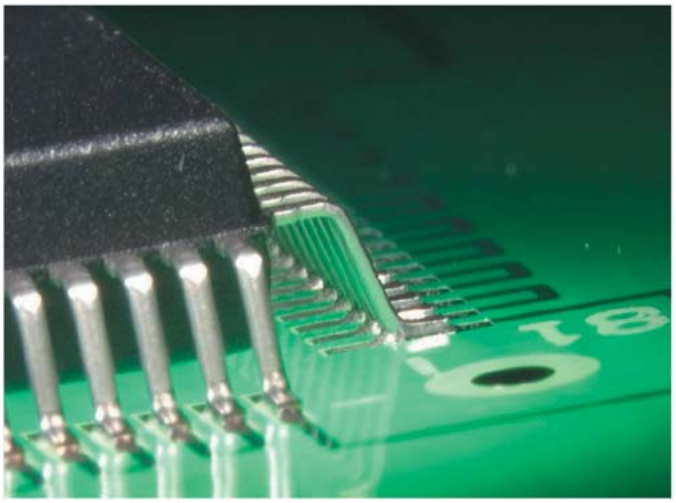
The Electrical Integration & Fabrication Division performs electrical design, analysis, fabrication, integration, and testing of hardware for a variety of NASA projects. The Division supports the Space Shuttle, International Space Station, Constellation, Chandra, and Hubble Space Telescope, as well as a number of payloads and experiments.



EMI/EMC Test Facility

- Performs research, engineering, design, development, technology development, analysis, test and evaluation of:
  - Electrical power systems, power electronics, power supplies, and electronic hardware for flight and ground support systems
  - Integration hardware, including cables, distributors, and circuit protection.

- Provides Electromagnetic Environmental Effects (E3) engineering and test support including electromagnetic interference (EMI)/electromagnetic capability (EMC) analysis.



- Electrical integration, generating:
  - System schematics
  - Interconnect diagrams to integrate electrical systems.

- Provides Electro-Mechanical design, analysis and assembly of space flight and GSE hardware. Engineering capabilities include:
  - Mechanical design
  - Printed wiring board design
  - Thermal analysis
  - EEE parts selection assistance
  - Screening and design support
  - EEE parts failure analysis
  - Acceptance Testing of cable and electrical assemblies.

E3 & Electrical Integration

The E3 & Electrical Integration Branch performs electrical integration engineering and electromagnetic environmental effect (E3) engineering. This Branch integrates avionics systems which includes design and development integration hardware such as cabling and ground support equipment. The E3 engineering function includes testing for electromagnetic interference (EMI), electrostatic discharge (ESD), and power quality testing for NASA space platforms.

This Branch consists of the Electrical Integration Design, Electrical Integration Hardware, and the Electromagnetic Environmental Effects (E3) Teams.

Specific capabilities, products, and expertise include:

- Electrical System Schematics
- Cable Interconnedt Diagrams
- Cable Harness Design
- Power Distribution
- Ground Support Equipment
- Circuit Protection
- Electrical Ordinance Initiation
- Electrical grounding and bonding
- E3 requirement development and tailoring
- EMC analysis
- EMI, ESD, & Power Quality Testing
- Lightning protection of launch vehicles

Parts, Packaging & Fabrication Branch

The Parts, Packaging, & Fabrication Branch performs Electro-Mechanical design, analysis and assembly of space flight and GSE hardware. Engineering capabilities include mechanical design, printed wiring board design, thermal analysis, EEE parts selection assistance, screening and design support, EEE parts failure analysis, aceptance testing of cable and electrical assemblies. Fabrication capabilities include electrical assembly, automated solder paste and parts placement from CAD data, BGA and SMT vapor phase reflow, cable fabrication, potting, part making, lead forming, out-gassing, conformal coating and integration. This Branch is also proactive in technology development in support of design, analysis and assembly of electronic hardware.

Specific capabilities, products, and expertise include:

- Parts Management and Control Programs
- EEE Parts Requirements
- Specifications
- Part Selection
- EEE Parts Screening
- Manufacturer Inspection and Certification
- EEE Parts Analysis & Verification
- Component Problem Resolution
- Environmental Scanning Electrno Microscopy
- Energy Dispersive X-ray Spectroscopy
- Radiography (including real time nano focus)
- Destructive Physical Analysis
- Electronic Packaging & Assembly
- Thermal Analysis and Imaging
- Embedded Packaging Assemblies
- Lead-free Solder Alloys
- Area Array Packaging

Electrical Power

The Electrical Power Branch performs research, design, development, build, test, and evaluation of flight and ground electrical power subsystems (EPS) including batteries, solar arrays, and fuel cells for power generation and including electronics hardware that converts, inverts, regulates, and/or isolates source power as required by the user.

The Electrical Power Branch consists of the Power Quality & Electronics Team and the Electrical Power Subsystem Team.

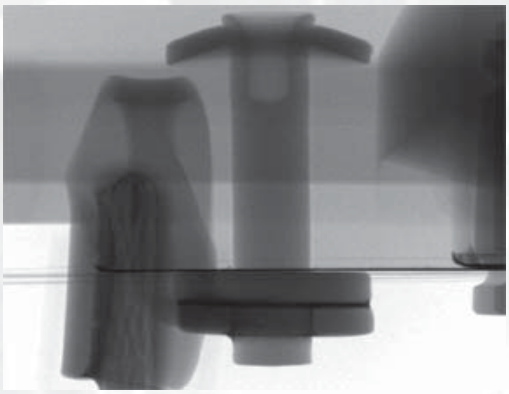
The primary focus of the Power Quality & Electronics Design Team is to design, development, test, and analyze power electronics hardware for power quality compliance of the electrical power consuming equipment and the source. Power quality compliance ensures that all power consuming interface circuits are compatible, both electrically and physically.

The primary focus of the Electrical Power Subsystem Team is to provide detailed product design, development, test, and evaluation of various power electronics hardware to meet the user's equipment needs. Support is provided as needed from initial concept, including breadboard and engineering model fabrication and test through final flight design, fabrication, test, launch, and operation.

The battery and cell testing is used for cell technology and cell- and battery-level flight qualification and accpetance testing.

Specific capabilities, products, and expertise include:

- Power electronics design, development, test, and analysis
- Circuit simulation
- ESP research, design, development, test, and evaluation
- ESP testing and simulation
- Power Quality Compliance
- Batteries
- Solar Arrays
- Design of custom electromagnetic and isolation transformers and inducors



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